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Case Report

Isolated trapezoid fracture: four cases of a rare fracture on MRI ☆☆☆

Douglas T Hidlay, Jr, M.D.^{a,*}, Scott Levine, M.D.^b^a University of Washington Medical Center, 1959 NE Pacific St, Seattle, WA^b Department of Diagnostic Imaging, Rhode Island Hospital, Warren Alpert School of Medicine at Brown University, Providence, RI

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ABSTRACT

Isolated trapezoid fractures have been rarely reported in the literature and are occult on routine radiography. Previously described cases have utilized computed tomography (CT) to make this diagnosis; however, magnetic resonance imaging (MRI) is better for soft tissue evaluation and can detect fractures which may be occult on CT. We report 4 cases of isolated trapezoid fractures diagnosed by MRI in 4 males after remote trauma, ages ranging from 19 to 62. In each case, initial work-up with radiography, and one case with CT, was negative for a fracture but an MRI was ultimately obtained due to high clinical suspicion, resulting in the diagnosis of an isolated trapezoid fracture. Based on literature review, these are the first cases of isolated trapezoid fracture diagnosed by MRI. MRI offers several advantages over CT and is more valuable in cases of suspected occult fracture, given the ability to evaluate soft tissue and ligamentous injuries.

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Introduction

Trapezoid fractures are rare [1] with nonspecific clinical findings and may be occult on routine radiography in absence of other concurrent pathology [2]. Historically, these have been managed surgically, which is at least in part due to the common presence of other injuries warranting intervention [1]. Multiple proposed mechanisms exist to explain these injuries [3], though the exact pathophysiology is unclear in many of the described cases. This injury has previously been

a CT diagnosis after unremarkable radiography [3–8]; however, there has been no utilization or discussion of MRI in the prior cases. Persistent clinical findings in absence of radiographic fracture may warrant early cross-sectional imaging with MRI instead of (or in addition to) CT rather than prolonged conservative management in patients where there is a high index of suspicion as CT cannot exclude all fractures. Additionally, the use of MRI may identify subtle osseous and soft tissue findings which may shed light on the mechanism of these fractures, given the multiple competing hypotheses.

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* Corresponding author.

E-mail address: dhidlayjr@gmail.com (D.T. Hidlay).

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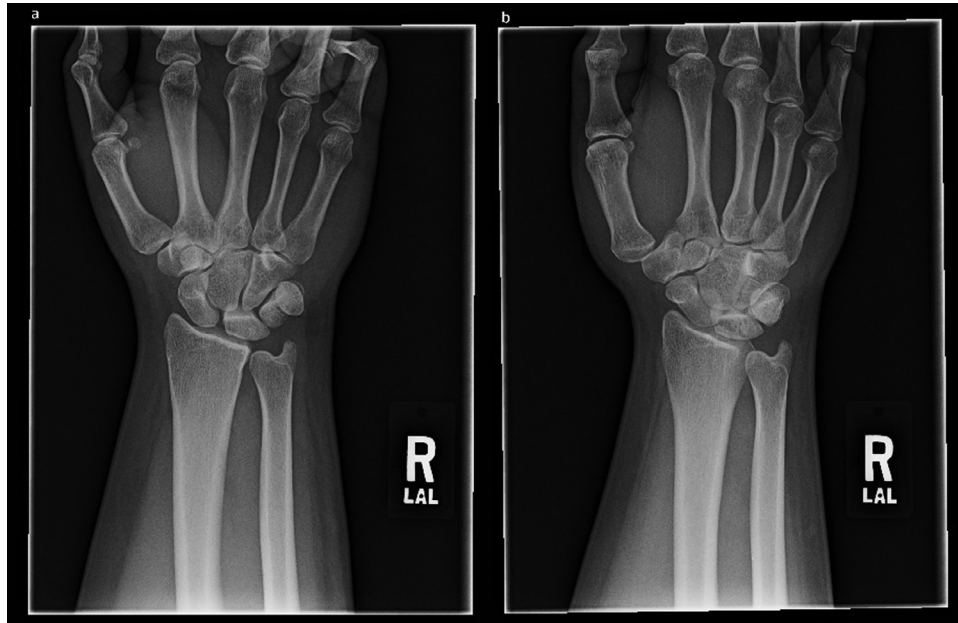


Fig. 1 – Anterior-posterior (a) and oblique (b) views of the right wrist demonstrate a normal appearance of the trapezoid. Incidental note of chronic degenerative changes in the proximal pole of the lunate is made.

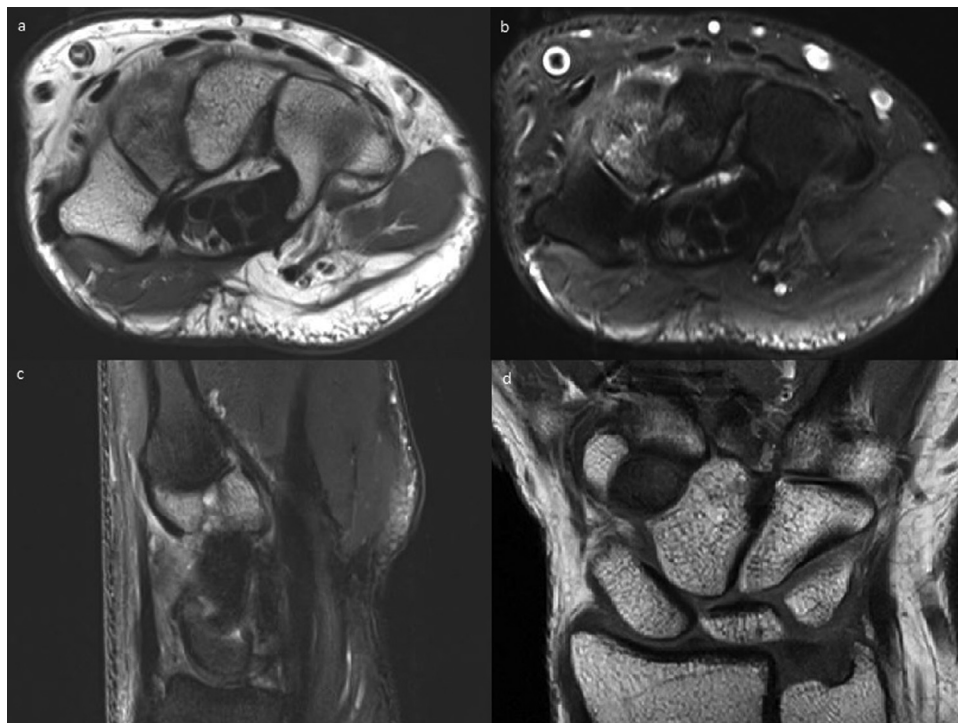


Fig. 2 – Axial proton density image (a) demonstrates a coronally-oriented band of low signal with corresponding edema on T2, fat-saturated images in both axial (b) and sagittal planes (c). There is a small amount of edema in the capitate along its radial aspect (b). The fracture is not visible on coronal T1-weighted images and the trapezium, capitate, and base of the second metacarpal show no evidence of fracture (d). There is a small amount of edema at the dorsal base of the second metacarpal.

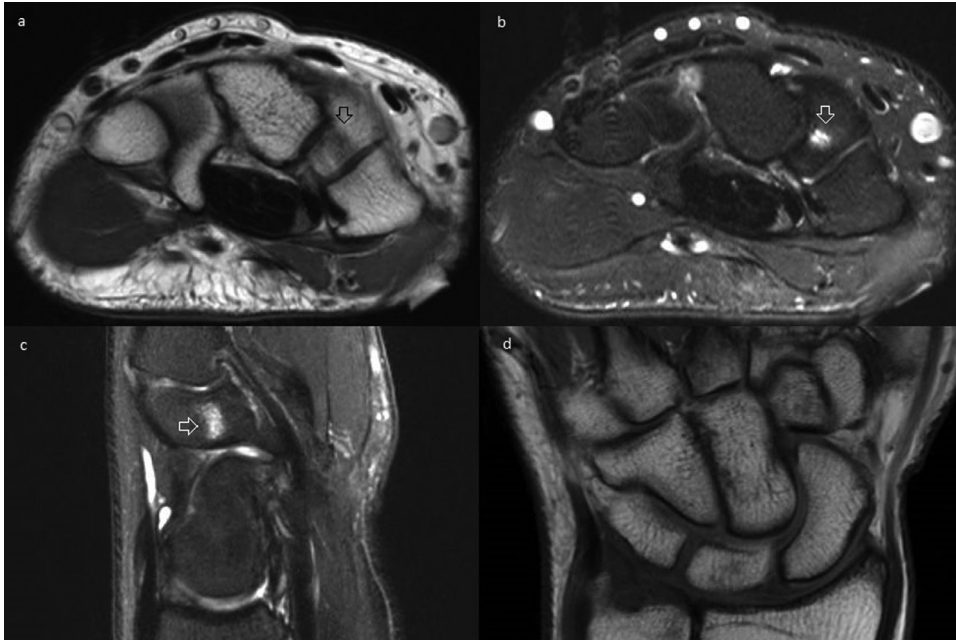


Fig. 3 – Axial proton density image (a) demonstrates a focal coronally-oriented band of low signal with corresponding edema on T2, fat-saturated images in both axial (b) and sagittal planes (c), more focal than the other demonstrated fractures. The fracture is difficult to see on coronal T1-weighted images, and there is no additional evidence of fracture (d).

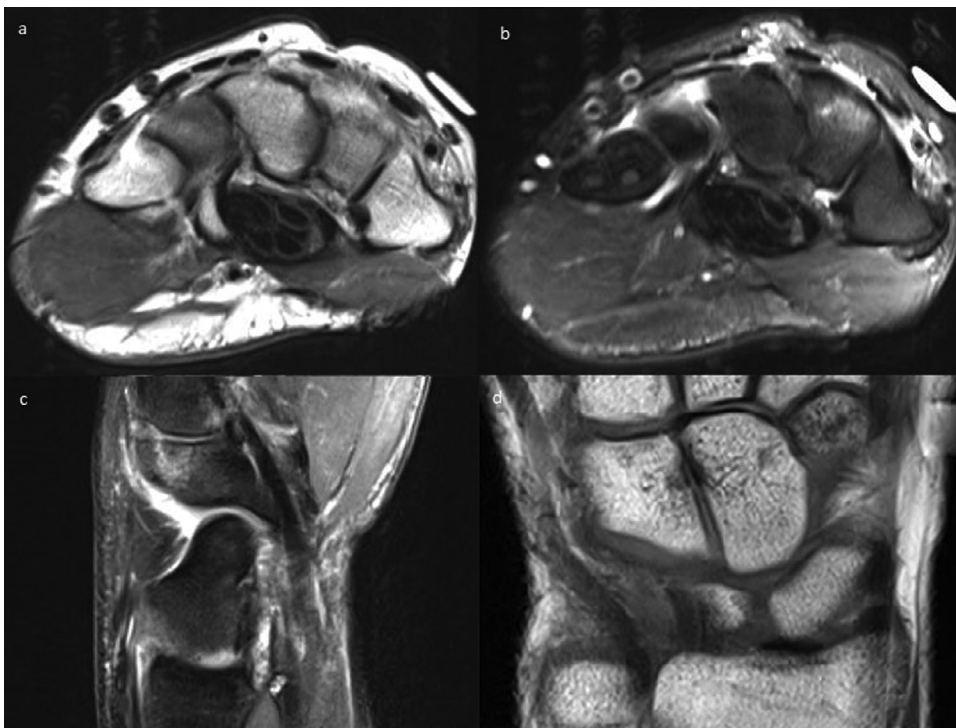


Fig. 4 – Axial proton density image (a) demonstrates another coronally-oriented band of low signal with corresponding edema on T2, fat-saturated images in both axial (b) and sagittal planes (c), similar to [Figure 2](#). There is a vitamin E marker in the area of the referred pain and the study is somewhat limited by motion. The fracture is difficult to see on coronal T1-weighted images, and there is no additional evidence of fracture (d).



Fig. 5 – Lateral view of the left wrist (a) shows dorsal soft tissue swelling without visible fracture. Sagittal (b), axial (c), and coronal (d) CT images of the left wrist demonstrate a normal appearance of the trapezoid when allowing for noise related to the patient's splint.

Case reports

A 19-year-old male presented to the emergency department with thumb and wrist pain after exchanging blows with an assailant. The patient endorsed immediate onset of focal pain in his dorsal wrist near the base of his thumb after landing his first punch during the fight. Physical exam revealed swelling, decreased range of motion, and bony tenderness over the dorsal carpal bones. Initial radiographs (Fig. 1) demonstrated no abnormality in the area of point tenderness. The patient was discharged with conservative management of temporary splinting, over-the-counter pain medications, and RICE (rest, ice, compress, elevate). The patient's symptoms and clinical findings persisted at 1 week follow-up and the patient was sent for a wrist MRI. This demonstrated a nondisplaced coronally-oriented fracture through the trapezoid (Fig. 2) with a small amount of reactive edema in the adjacent capitate and dorsal base of the second metacarpal. No additional traumatic pathology was seen. The patient was treated with pro-

longed immobilization in absence of concurrent injuries or dislocation. At 3-month follow-up, the patient had resolution of symptoms without further intervention.

In the next 2 cases, otherwise healthy adults present to their primary care physician weeks after trauma. In one, a 24-year-old male complained of persistent wrist pain after a fist fight several weeks prior, and in the other, an 18-year-old female endorsed continued wrist pain after direct trauma while playing hockey. Initial radiographs (not provided) were negative. Both patients were managed conservatively and referred to hand surgeons. Based on their evaluations, an occult scaphoid fracture was suspected in both cases and an MRI was obtained. Both demonstrated nondisplaced coronally-oriented fractures through the trapezoid (Figs. 3 and 4). No additional traumatic pathology was seen. Both patients were also treated with prolonged immobilization and had no further symptoms at 3 months.

In the final case, a 62-year-old male was brought to the emergency department after being thrown from his motorcycle at a high speed. The patient complained of severe pelvic

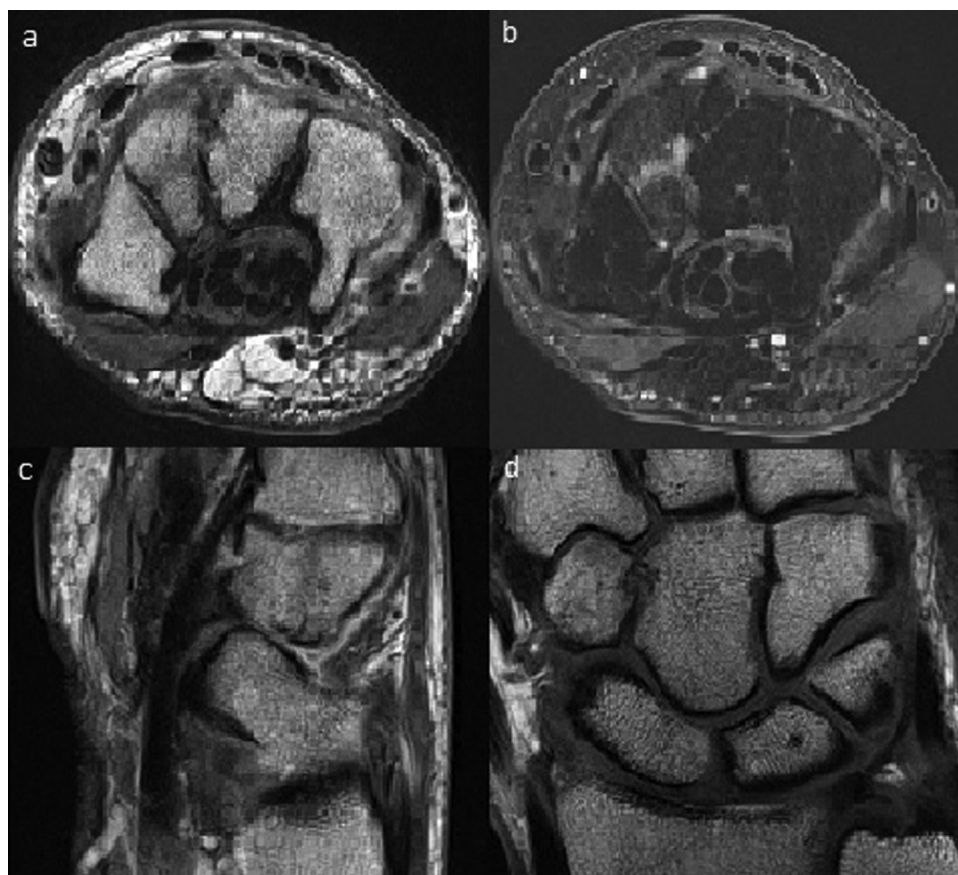


Fig. 6 – Axial proton density image (a) demonstrates a coronally-oriented band of low signal with corresponding edema on both axial T2, fat-saturated (b) and sagittal T2, nonfat-saturated images (c), similar to [Figure 2](#). The fracture is not visible on coronal T1-weighted images and the remainder of the exam shows no evidence of fracture or additional traumatic injury (d).

and milder left wrist pain at time of presentation. Initial work-up revealed complex pelvic fractures, but both radiography and CT of the left wrist at presentation failed to identify any injury beyond soft tissue swelling ([Fig. 5](#)). The patient did well after pelvic fixation and was discharged on hospital day 3. In the course of follow-up, his wrist pain persisted and MRI was ordered after 2 months of symptoms, which demonstrated a nondisplaced coronally-oriented fracture through the trapezoid ([Fig. 6](#)) without additional traumatic pathology. The patient was also managed conservatively by prolonged immobilization without intervention in absence of concurrent wrist pathology and was asymptomatic at his 3-month follow-up.

Discussion

Trapezoid fractures are rarely seen due to the relative shelter of multiple strong ligamentous attachments, accounting for as little as 0.4% of carpal bone fractures [9]. Isolated fractures without additional traumatic fractures or dislocations are even more rare [4–8]. In the few described cases, the mechanisms have varied significantly and include punching [5,6], as in the first case, a direct blow to the dorsum of the wrist [7], hyperextension [8], and hyperflexion [9]. The common fea-

tures of the injury include the sudden acuity of symptoms after injury, focal physical exam findings, and normal initial radiographic evaluation. MRI was critical for diagnosis in these patients, though previous reports focused on the utility of CT. The drawback of CT is made apparent in the final case, where the acute nondisplaced trapezoid fracture was missed. These radiographic images were initially reviewed by an experienced general radiologist in the ER, as well as in retrospect by 2 experienced musculoskeletal radiologists, who also could not confidently identify the pathology. MRI was clearly able to identify fractures in all cases and offered the ability to carefully evaluate concurrent ligamentous and soft tissue injuries, which may also be occult on CT.

In the emergency room setting, radiography and CT are certainly the most appropriate first tests; however, the absence of findings on either should not preclude MRI in patients with convincing clinical history and examination. There has been report of this diagnosis being made by ultrasonography, though this is likely impractical for the emergency room environment and at the most hospitals where such a specialist will not be available [10]. While this certainly is an uncommon injury, the increasing availability of MRI may ultimately show that the incidence of this fracture pattern is higher than previously expected as cases may have been missed on radiography and CT alone. Additionally, though the MRIs of these pa-

tients do not offer insight into the precise mechanism of this injury pattern given the absence of other findings, future MRI-positive cases may provide clarity on this topic. It is also worth noting that these 4 patients were managed successfully with prolonged immobilization without intervention with resolution of symptoms by 3 months, though these have traditionally been considered surgical injuries [1]. While the long-term outcomes are not yet known, the initial clinical results suggest surgery may not be necessary for treatment of these injuries despite historical precedent.

Conclusion

Isolated trapezoid fractures are typically undetectable on routine radiography and rare by previous reports. Cross-sectional imaging is needed to accurately diagnose the fracture, which is most often CT in the acute setting. MRI offers multiple advantages over CT and should be utilized early in evaluation of post-traumatic wrist pain with normal radiography and/or CT in cases of high clinical suspicion. Additionally, this short case series suggests that these fractures may be appropriately treated without surgical intervention, in contrast to previous studies.

Statement of human and animal rights

Institutional Review Board approval was not required for this report.

Statement of informed consent

Informed consent was not required for this report.

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